EC-8560, PXI-8565

ExpressCard-to-PXI Extension Kit

User's Manual

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Using this Manual

Audience and Scope

The EC-8560, PXI-8565 User's Manual is intended for hardware technicians and systems operators with knowledge of installing, configuring and using ExpressCard-to-PXI extension systems. This document is specifically intended to describe connecting ADLINK EC-8560 ExpressCard Systems to a PXI Extension Kit for extended functionality.

Manual Organization

This manual is organized as follows:

Preface: Presents important copyright notifications, disclaimers, trademarks, and associated information on the proper understanding and usage of this document and its associated product(s).

Chapter 1, Introduction: Introduces the ExpressCard to PXI™ Extension Kit overview, its features, applications, architecture, block diagrams, and package contents.

Chapter 2, Getting Started: Presents information on properly installing ExpressCard and PXI equipment and cabling a ExpressCard to PXI extension kit.

Chapter 3, Hardware Information: Presents layout information, technical drawings, jumper settings, and configuration.

Chapter 4, Troubleshooting: Provides basic information on quickly addressing configuration/setup/installation problems that may occur.

Important Safety Instructions: Presents safety instructions all users must follow for the proper setup, installation and usage of equipment and/or software.

Warranty Information: Presents important warranty information for users/manufacturers rights and responsibilities regarding ADLINK products and services.

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Conventions

Take note of the following conventions used throughout this manual to make sure that users perform certain tasks and instructions properly.



Additional information, aids, and tips that help users perform tasks.



Information to prevent ***minor*** physical injury, component damage, data loss, and/or program corruption when trying to complete a task.



Information to prevent ***serious*** physical injury, component damage, data loss, and/or program corruption when trying to complete a specific task.

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Reference Documentation

The following list of documents may be used as reference materials to support installation, configuration and/or the operation of the ExpressCard-to-PXI Extension Kit. This list is prepared in alphabetical order (by vendor name, then by document title) for clarity.

Vendor(s)/Association(s)	Title	Rev.
PCI-SIG	PCI Express Base Specification	1.0a
PCI-SIG	PCI-to-PCI Bridge Architecture Specification	1.2
PCI-SIG	PCI Local Bus Specification	3.0
PXI System Alliance	PXI Specification	2.2
PCMCIA	ExpressCard Standard Release	1.2

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Table of Contents

EC-8560, PXI-8565 i

Revision History ii

Preface iii

Copyright 2008 ADLINK TECHNOLOGY INC. iii
Disclaimer iii
Environmental Responsibility iii
Trademarks iii
Using this Manual iv
Conventions v
Reference Documentation vi
Getting Service vii

Table of Contents ix

List of Figures xi

List of Tables xiii

1 Introduction 1

1.1 Overview 1
1.1.1 Controlling PXI with ExpressCard 1
1.2 Package Contents 2
1.3 Specifications 3
1.4 Features 4
1.5 Applications 4

2 Getting Started 5

2.1 Installation Environment 5
2.2 Installing EC-8560 on a Laptop Computer 6
Installing the Sustaining Rack 7

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2.3 Installing PXI-8565 to a PXI Chassis 9
2.4 Cabling Laptop Computer to PXI Extension Chassis..... 10
2.5 Power-ON/OFF Sequence..... 12
2.6 LED Status..... 13

3 Hardware Information..... 15
3.1 Functional Block Diagram..... 15
3.2 EC-8560..... 16
3.3 PXI-8565 Layout, Connectors and Jumpers..... 17
3.4 Extension Cable Options 19

4 Troubleshooting (FAQ)..... 21

Important Safety Instructions..... 25

Warranty Policy 27

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List of Figures

Figure 2-1: EC-8560 to Laptop Installation Diagram 6
Figure 2-2: EC-8560 Sustaining Rack 7
Figure 2-3: PXI-8565 to PXI Chassis Installation Diagram 9
Figure 2-4: 3 M extension cable (ACL-EXPRESS-3) 10
Figure 2-5: Cabling 3 M Extension Cable to PXI™ Extension Chassis 11
Figure 2-6: Laptop Computer Connected to a PXI™ Extension Chassis 11
Figure 3-1: PCI Express-to-PXI Extension Kit Functional Block Diagram 15
Figure 3-2: EC-8560 Product Image 16
Figure 3-3: PCI-8565 Mechanical Layout 17
Figure 3-4: Standard 3 M extension cable (ALC-PCEEXT-3) 19

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List of Tables

Table 3-1: PXI-8565 Connectors, Jumpers and LED..... 17
Table 3-2: PXI-8565 J1 Spread Spectrum Clock Control 18
Table 3-3: Optional Extension Cables 19

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1 Introduction

This chapter introduces the ExpressCard-to-PXI Extension Kit, presents a general overview and basic applications, its package contents, specifications, and features.

1.1 Overview

Harnessing the bandwidth potential of ExpressCard, the Express-Card-to-PXI Extension Kit enables computers with a ExpressCard/34 slot to remotely manage and control PXI devices up to seven meters away, using the high-speed PCI Express interface. These extension systems operate in 32-bit/33 MHz configuration and come with complete end-to-end hardware and software transparency for the host system. Hardware devices installed in the extension system behave and work as if they are directly installed into the host system, requiring no additional drivers or software installation.

The host system may be separated from the extension system at up to seven meters using high-quality shielded twisted copper cables. The robust and reliable ExpressCard-to-PXI Extension Kit is suited for portable test and measurement applications with high-density I/O requirement and in hazardous industrial control and automation environments.

1.1.1 Controlling PXI with ExpressCard

Based on PCI Express technology, the ExpressCard-to-PXI Extension Kit provides bus expansion capability through its high-speed differential signal interface. The ExpressCard-to-PXI Extension Kit uses a signal equalizer and a ExpressCard-to-PCI bridge. With ADLINK's ExpressCard-to-PXI Extension Kit users can utilize an available ExpressCard slot to control an external PCI chassis. Because the PCI Express bridge is transparent, there is no need to install any additional software when using PXI devices in the external chassis.

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The ExpressCard-to-PXI Extension Kit implements a ExpressCard based control of PXI modules. The technology consists of a EC-8560 card installed in a host computer, a shielded cable, and a PXI-8565 card installed in the remote PXI chassis. The EC-8560 comes in a ExpressCard/34 footprint and communicates with the PXI-8565 via a twisted and shielded cable. The PXI-8565 converts the PCI Express interface into a PCI interface for additional PXI slots in the extension system.

The link between host laptop computer and the external chassis is a PCI Express X1 link that represents a dual-simplex communications channel consisting of two, low-voltage differentially driven signal pairs. The signaling rate can reach up to 2.5 Gbps in each direction. Using a shielded and twisted cable, the maximum extension distance can be up to 7 M without decreasing signal rate.

1.2 Package Contents

ExpressCard-to-PXI Extension Kit

- EC-8560, packaged separately.
- PXI-8565 (PCI Express controller for PXI interface)
- 3m extension cable
- ExpressCard Sustaining Rack
- User's manual



If any of the items on the contents list are missing or damaged, contact your ADLINK dealer.

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1.3 Specifications

EC-8560 (on host laptop computer)

- Compliant with ExpressCard Standard Release 1.2
- Compliant with PCI Express Base Specification Rev. 1.0a
- PCI Express X1 link with 250 MB/s data throughput
- Extended distance of up to 7 meters
- Dimensions: ExpressCard/34 (108mm(W) X 34mm(H))
- Power requirements: +3.3V, 210mA (max)

PXI-8565 (on extension PXI chassis)

- Compliant with PCI-to-PCI Bridge Architecture Specifications Rev. 1.2
- Supports 5V and 3.3V PCI bus
- Supports 32-bit/33MHz full data throughput
- Extended distance of up to 7 meters
- Power requirements: +3.3V, 720mA

Operating and Storage Environments

- Operating temperature: 0°C to 50°C
- Storage temperature: -20°C to 80°C
- Relative humidity: 10% to 90%, non-condensing

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1.4 Features

- ExpressCard control of PXI cards
- High-speed PCI Express X1 interface
- Compatible with 5V and 3.3V PCI bus
- Supports 32-bit/33 MHz PCI interface
- Extension lengths of 1m, 3m and 7m
- Complete hardware and software transparency
- Compliant with PCI Express Base Specification, Revision 1.0a
- Compliant with PCI-to-PCI Bridge Architecture Specification, Revision 1.2
- Compliant with PCI Local Bus Specification, Revision 3.0
- Compliant with ExpressCard Standard Release 1.2

1.5 Applications

These extension systems are suitable for:

- Electronics manufacturing testing
- High-density I/O systems
- Industrial automation and control
- Military and aerospace
- Testing systems for remote and/or harsh environments

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2 Getting Started

This chapter describes the installation environment, installation procedures, cabling the equipment, and instructions on powering-on/off the EC-8582 ExpressCard to PCI Extension System.


NOTE:

Diagrams and images of equipment mentioned are used for reference only. Actual system appearance may vary.

2.1 Installation Environment

Whenever unpacking and preparing to install any equipment described in this manual, please refer to the ***Important Safety Instructions*** chapter of this manual.

Only install equipment in well lit areas on flat, sturdy surfaces with access to basic tools such as flat and cross head screwdrivers.

The ExpressCard-to-PXI Extension Kit contains several electro-static sensitive components that can be easily damaged by static electricity. For this reason, the card and chassis should be handled on a grounded anti-static mat and the operator should wear an anti-static wristband during the unpacking and installation procedure.

Please also inspect the components for apparent damage. Improper shipping and handling may cause damage to the components. Be sure there is no shipping and handling damage on the components before continuing.


CAUTION:

Do not apply power to any equipment if it has been damaged.

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2.2 Installing EC-8560 on a Laptop Computer

1. Power-off your laptop computer and locate its Express-Card slot.
2. Locate your 3M extension cable (ACL-EXPRESS-3). Screw the ACL-EXPRESS-3 cable to the EC-8560.
3. Insert the EC-8560 into an available ExpressCard slot in your laptop computer. Be sure to firmly attach the EC-8560 to the ExpressCard slot.

Figure 2-1: EC-8560 to Laptop Installation Diagram



NOTE:

The EC-8560 is equipped with a sustaining rack. Please check if your laptop computer is equipped with an ExpressCard/34 or ExpressCard/54 for sustaining rack support.

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Installing the Sustaining Rack

If your laptop computer is equipped with a ExpressCard/54, you will need a sustaining rack to adequately attach the EC-8560. The sustaining rack adds secure connectivity. Refer to the following steps to install the sustaining rack onto the EC-8560.

Figure 2-2: EC-8560 Sustaining Rack

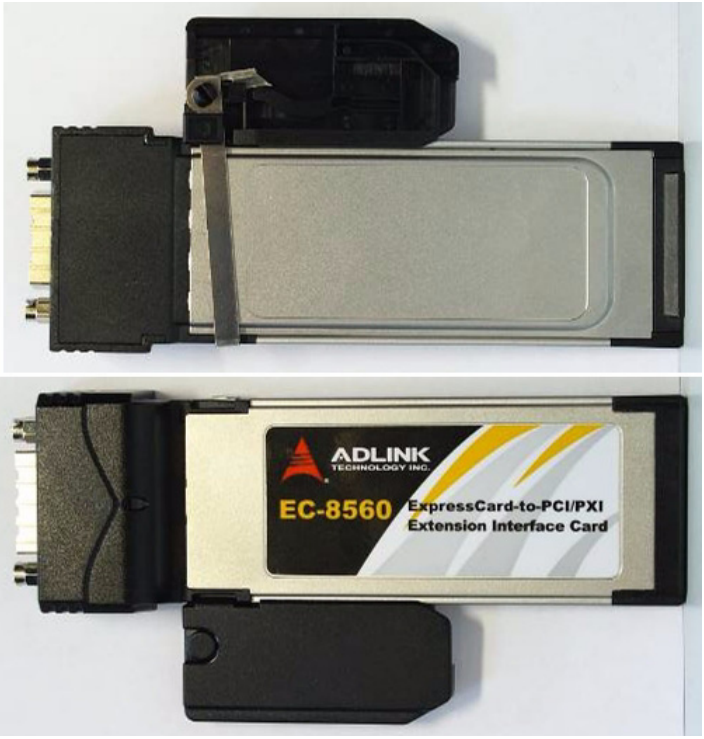


1. The EC-8560 sustaining rack has a metalic arm that is placed behind the ExpressCard and locked into place with the short hook/clip at the edge of the metalic arm.



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2. Secure the sustaining rack and insert the assembled EC-8560 and sustaining rack into your ExpressCard/54 normally.



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2.3 Installing PXI-8565 to a PXI Chassis

1. Locate your PXI chassis (for illustration purposes, we use the ADLINK PXIS-2508) and plug-in the AC power cord but **DO NOT** power-on the equipment.
2. Remove the cover panel of the PXI chassis system slot.
3. Locate your PXI-8565 and remove it from its packaging. (Please wear anti-static gloves and use an anti-static surface when handling the card).
4. Install the PXI-8565 into the PXI system slot and tighten the bracket-retaining screws on the top and bottom of the panel to fasten the PXI-8565 to the chassis.

Figure 2-3: PXI-8565 to PXI Chassis Installation Diagram



WARNING:

The PXI-8565 must be installed into the PXI system slot. Installing the PXI-8565 into a peripheral slot is forbidden.

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2.4 Cabling Laptop Computer to PXI Extension Chassis

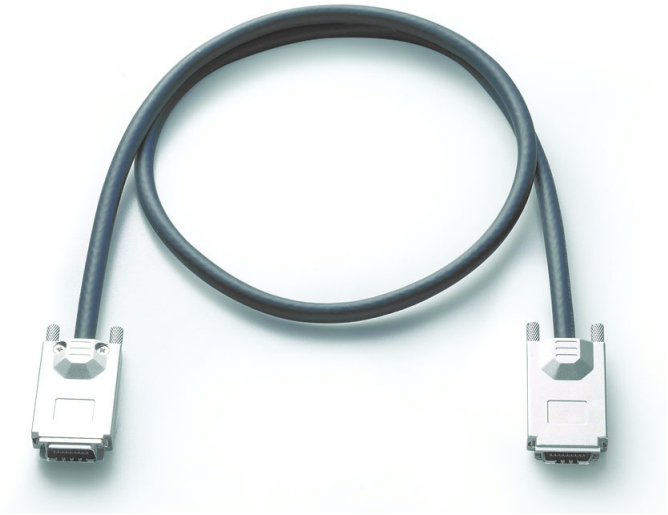
Now that you have successfully installed the EC-8560 into the Host computer and/or installed a PXI device in the PXI extension chassis, you may connect the Host Computer and PXI extension chassis with an extension cable.

CAUTION:

Do not remove the extension cable after the system is powered on. It may cause system errors or data loss. If the cable is unplugged improperly, reconnect it and reboot the host PC and extension chassis.

1. Locate your 3 M extension cable. One end should already be connected to the EC-8560.

Figure 2-4: 3 M extension cable (ACL-EXPRESS-3)



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2. Connect the other end of the 3 M extension cable to the PXI-8565 serial link connector of the extension PXI chassis.
3. Firmly attach the 3 M extension cable by tightening its retention screws.
4. Connect the other end of the 3 M extension cable to the PXI-8565 serial link connector of the PXI extension chassis (PXIS-2508).

Figure 2-5: Cabling 3 M Extension Cable to PXI™ Extension Chassis

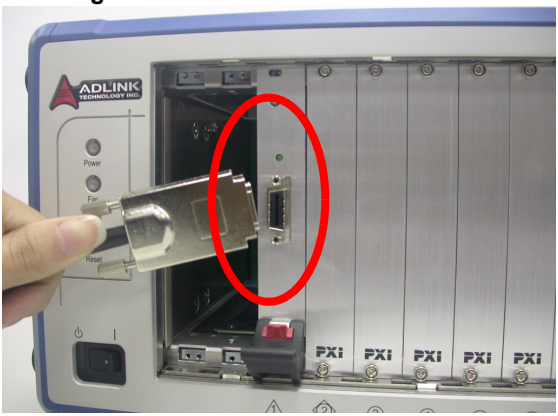


Figure 2-6: Laptop Computer Connected to a PXI™ Extension Chassis



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2.5 Power-ON/OFF Sequence

To power-on the PCI Express-to-PXI Extension Kit, follow these steps:

1. Check that the 3 M extension cable is properly connected to the host PC and extension chassis.
2. Power-on the PXI extension chassis first.
3. Power-on the host PC

.



DO NOT remove the cable after the system and extension chassis are powered on. Disconnecting the cable while the system is running may cause unpredictable system errors and/or system crash.

As the ExpressCard-to-PXI Extension Kit is a standard EC-to-PCI bridge interface, the BIOS will identify each device behind the PCI bridge and assign resource to each one during start up. Thus users have to power-on the PXI chassis first in order to get appropriate resources from the BIOS.

To power-off the PCI Express-to-PXI Extension Kit, follow these steps:

1. Power-off the host laptop computer.
2. Power-off the extension chassis.



DO NOT power-off the extension chassis until the host laptop computer is powered off. If the extension chassis is powered off while the host laptop computer is on, the host laptop computer may hang or crash.

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2.6 LED Status

The LEDs on the EC-8560 and PXI-8565 give power status information. The LEDs light up only when the following conditions are met:

- The extension cable between the EC-8560 (Host Laptop Computer) and PXI-8565 (Extension Chassis) is properly connected.
- The extension chassis is powered on.
- The host PC is entering its Power-On Self Test (POST).

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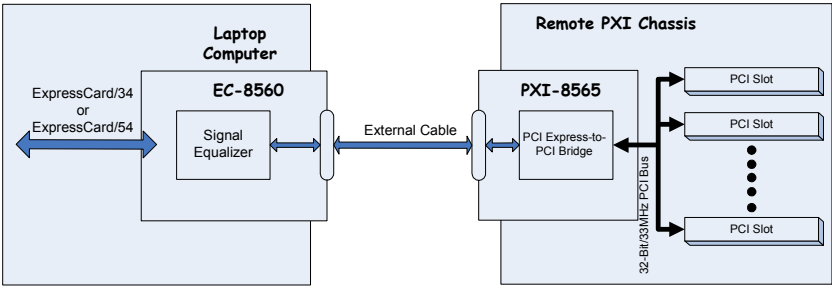
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3 Hardware Information

3.1 Functional Block Diagram

Figure 3-1: PCI Express-to-PXI Extension Kit Functional Block Diagram



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3.2 EC-8560

The EC-8560 is an ExpressCard/34 form factor module that re-drives PCI Express signals to an extension chassis via the ACL-EXPRESS cable. Users can plug EC-8560 into an ExpressCard/34 or ExpressCard/54 slot equipped laptop computers.

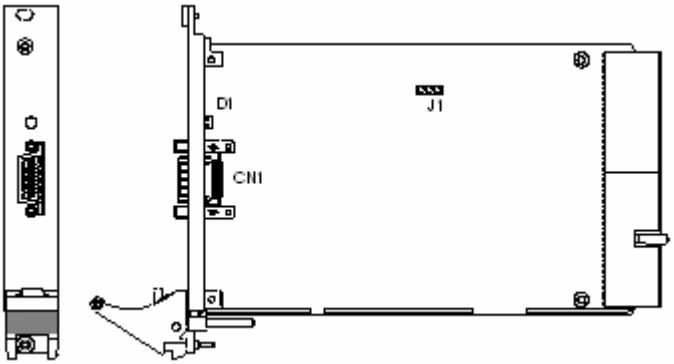
Figure 3-2: EC-8560 Product Image



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3.3 PXI-8565 Layout, Connectors and Jumpers

Figure 3-3: PCI-8565 Mechanical Layout



Connector/Jumper/LED	Description
J1	Spread spectrum clock control
CN1	PCI Express serial link connector
D1	Serial Link Status LED

Table 3-1: PXI-8565 Connectors, Jumpers and LED

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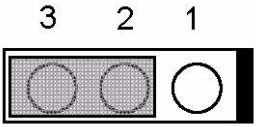
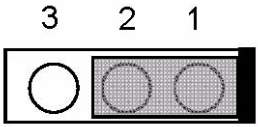
Setting	Description
	Enables spread spectrum control. When enabling spread spectrum control, the PCI clock will be modulated with a low frequency carrier, the peak EMI can be greatly reduced in the system (Default).
	Disables spread spectrum control.

Table 3-2: PXI-8565 J1 Spread Spectrum Clock Control

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3.4 Extension Cable Options

The ExpressCard-to-PXI extension system is available with three different cables in length. These cables are designed to transfer high speed signals and have high immunity from electromagnetic interference.



Figure 3-4: Standard 3 M extension cable (ALC-PCEEXT-3)

Part Number	Description
ACL-EXPRESS-1	1 M, PCI Express-to-PCI extension cable
ACL-EXPRESS-3	3 M, PCI Express-to-PCI extension cable
ACL-EXPRESS-7	7 M, PCI Express-to-PCI extension cable

Table 3-3: Optional Extension Cables

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4 Troubleshooting (FAQ)

This chapter describes frequently asked questions that may guide the user to solve minor problems they may encounter.

This Troubleshooting (FAQ) applies to:

- ExpressCard-to-PCI Extension System: including ECS-8582-4S.
- ExpressCard-to-PXI Extension Kit: including EC-8560 and PXI-8565.

In the following description, the products will be renamed as "PCI Express Bus Extension Products".

Question: What is the maximum extension length of PCI Express Bus Extension Products?

Answer: The maximum extension length is 7 M. ADLINK offers three different cables in length for customer's applications, 1 M, 3 M and 7 M.

Question: When using ADLINK PCI Express Bus Extension Products, is there any additional driver or software required to install?

Answer: ADLINK PCI Express Bus Extension Products are designed to be standard PCI Express-to-PCI bridges. It is not necessary to install additional drivers or software for support.

Question: How many extension chassis can I connect to a host PC by using ADLINK PCI Express Bus Extension Products?

Answer: Due to the point-to-point architecture of PCI Express, only one ADLINK PCI Express Bus Extension Product can be supported by one chassis. However, users can select multiple extension chassis for different purposes. For example, a 4-slot extension chassis provides small and compact

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form factor while an 18-slot extension chassis provides more PCI slots. Theoretically, PCI specification allows up to 255 PCI bus segments. ADLINK PCI Express Bus Extension Products do not limit the bus segment number. The maximum PCI bus segments may limited by your BIOS or operating system.

Question: Is there any compatibility problems with the ADLINK PCI Express-to-PXI extension kit?

Answer: ADLINK PCI Express Bus Extension Products are designed as standard PCI Express-to-PCI Bridge. During PC boot up, your PC BIOS will search devices and assign resources such as, I/O, memory space and IRQ number, to each device according to its algorithm. Although PCI specification allows up to 255 bus segments in a PC system, the BIOS may not assign the correct and/or proper resource to each device in some complex PCI systems.

Because the PCI Express specification was released in 2002, most hardware and circuit board designers as of yet do not offer multiple PCI-to-PCI bridges. Most BIOS work for simple applications but may not work for multiple PCI bus segments and a variety of resource requests. We suggest customers choose PC equipment with Intel 945, 965 or later chipsets to adjust for these issues.

Question: When I encounter compatibility problems, what should I do?

Answer: Because most compatibility problems come from PCI resource assignments, customers should consult their PC vendors or BIOS vendors for help. Updating to the most current BIOS version may also resolve PCI resources problems.

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The following list are some indications that may help customers to deal with compatibility issues:

1. Disable the onboard device functions of your host PC to release IO resources.
2. Remove PCI devices plugged/installed in your host PC.
3. Connect an extension chassis which is single bus segment to the host PC. Plug a PCI device to an extension chassis one by one and boot each in sequence to check if your host PC can accommodate the PCI device or not.
4. You may try to plug the PCI Express extension host card to a different PCI Express slot.

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Important Safety Instructions

For user safety, please read and follow all **instructions**, **WARNINGS**, **CAUTIONS,** and **NOTES** marked in this manual and on the associated equipment before handling/operating the equipment.

- Read these safety instructions carefully.
- Keep this user's manual for future reference.
- Read the specifications section of this manual for detailed information on the operating environment of this equipment.
- When installing/mounting or uninstalling/removing equipment:
  - Turn off power and unplug any power cords/cables.
- To avoid electrical shock and/or damage to equipment:
  - Keep equipment away from water or liquid sources;
  - Keep equipment away from high heat or high humidity;
  - Keep equipment properly ventilated (do not block or cover ventilation openings);
  - Make sure to use recommended voltage and power source settings;
  - Always install and operate equipment near an easily accessible electrical socket-outlet;
  - Secure the power cord (do not place any object on/over the power cord);
  - Only install/attach and operate equipment on stable surfaces and/or recommended mountings; and,
  - If the equipment will not be used for long periods of time, turn off and unplug the equipment from its power source.

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- Never attempt to fix the equipment. Equipment should only be serviced by qualified personnel.
- A Lithium-type battery may be provided for uninterrupted, backup or emergency power.



RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORECT TYPE. DISPOSE OF USED BATTERIES ACCORDING TO THEIR INSTRUCTIONS.

- Equipment must be serviced by authorized technicians when:
  - The power cord or plug is damaged;
  - Liquid has penetrated the equipment;
  - It has been exposed to high humidity/moisture;
  - It is not functioning or does not function according to the user's manual;
  - It has been dropped and/or damaged; and/or,
  - It has an obvious sign of breakage.

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Warranty Policy

Thank you for choosing ADLINK. To understand your rights and enjoy all the after-sales services we offer, please read the following carefully.

1. Before using ADLINK's products please read the user manual and follow the instructions exactly. When sending in damaged products for repair, please attach an RMA application form which can be downloaded from: http://rma.adlinktech.com/policy/

2. All ADLINK products come with a limited two-year warranty, one year for products bought in China:

- The warranty period starts on the day the product is shipped from ADLINK's factory.
- Peripherals and third-party products not manufactured by ADLINK will be covered by the original manufacturers' warranty.
- For products containing storage devices (hard drives, flash cards, etc.), please back up your data before sending them for repair. ADLINK is not responsible for any loss of data.
- Please ensure the use of properly licensed software with our systems. ADLINK does not condone the use of pirated software and will not service systems using such software. ADLINK will not be held legally responsible for products shipped with unlicensed software installed by the user.
- For general repairs, please do not include peripheral accessories. If peripherals need to be included, be certain to specify which items you sent on the RMA Request & Confirmation Form. ADLINK is not responsible for items not listed on the RMA Request & Confirmation Form.

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3. Repair service is not covered by ADLINK's two-year guarantee in the following situations:

- ▶ Damage caused by not following instructions in the User's Manual.
- ▶ Damage caused by carelessness on the user's part during product transportation.
- ▶ Damage caused by fire, earthquakes, floods, lightening, pollution, other acts of God, and/or incorrect usage of voltage transformers.
- ▶ Damage caused by inappropriate storage environments such as high temperatures, high humidity, or volatile chemicals.
- ▶ Damage caused by leakage of battery fluid during or after change of batteries by customer/user.
- ▶ Damage from improper repair by unauthorized technicians.
- ▶ Products with altered and/or damaged serial numbers are not entitled to our service.
- ▶ This warranty is not transferable or extendable.
- ▶ Other categories not protected under our warranty.

4. Customers are responsible for all fees necessary to transport damaged products to ADLINK.

5. To ensure the speed and quality of product repair, please download an RMA application form from our company website: http://rma.adlinktech.com/policy/ Products with attached RMA forms receive priority.

For further questions, please e-mail our FAE staff:
service@adlinktech.com.

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